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## 2.1 INTRODUCTION

This section describes rules and procedures required to operate the bridge.

Information provided in this section includes:

- The correct status of the electrical equipment prior to an emergency condition - identified as the Normal Operation Status.
- The appropriate procedures to operate the Remote Monitoring and Control Panel in the Mercer Island Bridge Shop office.
- The appropriate procedures to operate the bypass switches in the Dupline Control System Panel in the Mercer Island Bridge Shop lower level.
- The Emergency Warning Scenarios that may develop during an alarm condition and the procedures to respond to the alarms.
- The procedure to dewater pontoons.

## 2.2 NORMAL OPERATION STATUS

On the facing page is a schematic of the Remote Monitoring and Control Panel identifying each push button and indicator light on the Control Panel for the normal status. The schematic also shows which of the indicator lights are energized (illuminated) and/or de-energized (turned off), and the position of each bypass switch. The normal status is as follows:

- All Circuit Breakers at the Dupline Control System Panel - located in the Mercer Island Bridge Shop lower level - are closed (on).
- All **red** Navigation Pier Lights on the concrete pontoons and pier foundations and all **green** Navigation Span Lights are illuminated while dark.
- Indicator lights located on the Remote Monitoring and Control Panel are as follows:
  - The **red** indicator light located above the panel is de-energized (off) and the annunciator alarm horn is silent.
  - The one **red** 'BYPASS ON' indicator light (located adjacent to the text 'Homer Hadley Bridge Remote Monitoring and Control') is de-energized (off).
  - The eighteen **yellow** 'PONTOON LIGHTS ON INDICATOR' indicator lights may be any combination of energized (illuminated) or de-energized (off).
  - The six **red** 'BREAKER FAULT ALARM' indicator lights are de-energized (off).
  - The six **red** 'TRANSFORMER HIGH TEMP ALARM' indicator lights are de-energized (off).
  - The six **red** 'SMOKE DETECTOR ALARM' indicator lights are de-energized (off).
  - The eighteen **red** 'WATER LEVEL ALARM' indicator lights are de-energized (off).

- Refer to the 'Operations, Inspection and Maintenance Manual Lacey V. Murrow Bridge' for the normal operation status of the Lacey V. Murrow Bridge Remote Monitoring and Control Panel section.
- All bypass switches in the Dupline Control System Panel 'HH' (located in the Mercer Island Bridge Shop lower level) are placed in the 'normal' position.

## 2.3 REMOTE MONITORING AND CONTROL PANEL OPERATION

The Remote Monitoring and Control Panel monitors the pontoons to determine the status of each pontoon and the control system. The Remote Monitoring and Control Panel:

- Indicates whether pontoon interior cell lighting is energized
- Remotely de-energizes the pontoon interior cell lighting
- Indicates whether a pontoon P1 Panel breaker fault alarm has been activated.
- Indicates whether a pontoon transformer high temperature alarm has been activated
- Indicates whether a pontoon smoke alarm has been activated
- Indicates whether a water level alarm has been activated
- Remotely energizes/de-energizes the navigation lighting
- Indicates whether a bypass switch has been activated

The Control Panel has the controls and indications for both the Lacey V. Murrow Bridge and the Homer Hadley Bridge. The Control Panel upper half is for the Homer Hadley Bridge and lower half of the Control Panel is for the Lacey V. Murrow Bridge. The upper half is labeled 'Homer M Hadley Bridge Remote Monitoring and Control.'

### 2.3.1 Red Indicator Light and Annunciator Alarm Horn

There is one **red** indicator light and an annunciator alarm horn located above the Remote Monitoring and Control Panel. During normal operating conditions the **red** indicator light will be de-energized (off) and the annunciator alarm horn will be silent.

The **red** indicator light will illuminate and the annunciator alarm horn will sound during an alarm condition on either the Lacey V. Murrow Bridge or the Homer Hadley Bridge.

If this occurs, the operator is to inspect the panel to determine where the alarm occurred. An alarm is indicated by an energized (illuminated) **red** indicator light on the panel. Refer to the indicator lights description and location below to determine how to proceed. If none of the **red** indicator lights are illuminated, refer to Section 2.3.11 "Lamp Test Pushbutton" and test the indicator lights to see if any of the lights are out of service.

If the alarm condition occurs on the Lacey V. Murrow Bridge, refer to the 'Operations, Inspection and Maintenance Manual Lacey V. Murrow Bridge' to determine how to proceed with the alarm.

### 2.3.2 Bypass On Indicator

The **red** 'BYPASS ON' indicator light is illuminated if any of the bypass switches in the Dupline Control System Panel in the lower level of the Mercer Island Bridge Shop has been placed from the 'normal' position to the 'override' position. Switches may be placed in the override position when testing or repairs are being performed. Operating the bypass switches prevents the Auto Dialer from announcing an alarm and the horn in the control panel from sounding.

The procedure for the operation of the bypass switches is presented in Section 2.4.

### 2.3.3 Pontoon Lights On Indicator

The eighteen **yellow** 'Pontoon Lights On Indicator' indicator lights may be any combination of energized (illuminated) or de-energized (off). The **yellow** indicator lights show the status of the pontoon interior cell lighting. If the indicator light is energized, then the pontoon interior lights in the indicated pontoon are on. There is one indicator light for each pontoon.

If any of the **yellow** 'Pontoon Lights On Indicator' are energized, this does not indicate an alarm condition.

### 2.3.4 Pontoon Lights Out Pushbutton

There are eighteen **black** 'Pontoon Lights Out Pushbutton' pushbuttons. These pushbuttons allow the operator to remotely turn off the pontoon interior cell lighting for each pontoon. If any of the eighteen **yellow** 'Pontoon Lights On Indicator' indicator lights are energized (illuminated), this indicates that the pontoon interior cell lighting is energized. Depressing the **black** 'Pontoon Lights Out Pushbutton' pushbutton for the pontoon which has energized lights will remotely turn off the lights in that pontoon. The operator **MUST** verify that no workers are in the pontoon before operating the pushbutton.

The **black** 'Pontoon Lights Out Pushbutton' pushbuttons are not associated with any alarm conditions.

### 2.3.5 Breaker Fault Alarm Indicator

There are six **red** 'BREAKER FAULT ALARM' indicator lights. The **red** 'BREAKER FAULT ALARM' indicator lights will illuminate if the circuit breakers in the P1 Panel in Pontoons B, E, H, K, N, or Q trip.

The operator shall refer to Emergency Warning Scenarios Section 2.5.1 "Breaker Fault Alarms" on how to proceed.

### 2.3.6 Transformer High Temp Alarm Indicator

There are six **red** 'TRANSFORMER HIGH TEMP ALARM' indicator lights. The **red** 'TRANSFORMER HIGH TEMP ALARM' indicator lights will illuminate if any of the transformers located in Pontoons B, E, H, K, N, or Q overheat.

The operator shall refer to Emergency Warning Scenarios Section 2.5.2 "Transformer High Temp Alarms" on how to proceed.

### 2.3.7 Smoke Detector Alarm Indicator

There are six **red** 'SMOKE DETECTOR ALARM' indicator lights. The **red** 'SMOKE DETECTOR ALARM' indicator lights will illuminate if smoke is present in any of the cells equipped with transformers, which are located in Pontoons B, E, H, K, N, and Q.

The operator shall refer to Emergency Warning Scenarios Section 2.5.3 "Smoke Detector Alarms" on how to proceed.

### 2.3.8 Water Level Alarm Indicator

There are eighteen **red** 'WATER LEVEL ALARM' indicator lights. The **red** 'WATER LEVEL ALARM' indicator lights will illuminate when the water level in a pontoon cell indicates a high water level.

The operator shall refer to Emergency Warning Scenarios Section 2.5.4 "Water Level Alarm."

### 2.3.9 Navigation Lights On/Off Pushbutton

There is one **black** 'NAVIGATION LIGHTS ON/OFF PUSHBUTTON' pushbutton. This pushbutton operates the navigation lights.

The primary control for the navigation lights is a photo-electric cell located on a concrete pad adjacent to the medium voltage service switchgear on the northwest approach. This cell will activate the navigation lights to turn on during the night and off during the day.

The **black** 'NAVIGATION LIGHTS ON/OFF PUSHBUTTON' pushbutton will operate as follows:

1. If the navigation lights are off during the day, depressing the button will turn the lights on.
2. If the navigation lights are on during the day, depressing the button will turn the lights off.
3. If the navigation lights are off during the night (due to the photo-electric cell failure), depressing the button will turn the lights on.
4. If the navigation lights are on during the night, depressing the button will have no effect.

If the navigation lights do not illuminate properly at night, then the operator shall refer to Emergency Warning Scenarios Section 2.5.5 "Navigation Light Photo-Electric Cell Failure."

### 2.3.10 Alarm Volume Dial

There is one **black** 'ALARM VOLUME' dial at the bottom of the Remote Monitoring and Control Panel. Rotating the dial increases or decreases the volume of the annunciator horn.

### 2.3.11 Lamp Test Pushbutton

There is one **red** pushbutton located below the 'ALARM VOLUME' dial. Pressing this pushbutton will cause all the indicator lights on the panel to energize (illuminate). If any indicator light does not energize (illuminate), the indicator light is inoperable and should be replaced immediately.

## 2.4 HH BYPASS PANEL OPERATION

On the facing page is a schematic of the HH Bypass Panel identifying each bypass switch on the panel. The HH Bypass Panel is located in the Dupline Control System Panel in the Mercer Island Bridge Shop lower level. This panel allows the operator to prevent the Dupline Control System autodialer operation when the equipment is being tested or repaired, and also silences the annunciator alarm horn located above the Remote Monitoring and Control Panel.

The HH Bypass Panel has five types of bypass switches that bypass the alarms for the smoke detector, transformer high temperature, circuit breaker trip, all bridge alarms, and the high water sensor. The operation and function of the switches is discussed below.

### 2.4.1 Smoke Bypass Switch

There is a bypass switch for each smoke detector located in Pontoons B, E, H, K, N, and Q. The smoke detectors monitor the pontoon cells with transformers in the cells for smoke.

#### CAUTION

**Bypass switches are for emergency situations only. If bypass switch operation is required do not continue without contacting the Mercer Island Bridge Crew (MIBC).**

The bypass switch is placed in the ‘override’ position when the smoke detector is being tested or when the smoke detector is being repaired. In order to bypass a smoke detector in a specific pontoon, place the switch for the pontoon from the ‘normal’ position to the ‘override’ position. Place a red and white tag on the switch to clearly indicate that the switch has been placed in the bypass position. Tags are located on the right hand side of the panel.

When a bypass switch is placed in the ‘override’ position, the Remote Monitoring and Control Panel ‘BYPASS ON’ **red** indicator light will illuminate (consult Section 2.3.2 “‘BYPASS ON’ Indicator” for additional information). If the alarm was active, then the **red** indicator light will de-energize and the annunciator alarm horn will silence (consult Section 2.3.1 “Red Indicator Light and Annunciator Alarm Horn” for additional information).

### 2.4.2 Temp Bypass Switch

There is a bypass switch for each temperature sensor in the high voltage transformers, which are located in Pontoons B, E, H, K, N, and Q. The temperature sensors monitor the transformers internal temperature.

#### CAUTION

**Bypass switches are for emergency situations only. If bypass switch operation is required do not continue without contacting the Mercer Island Bridge Crew (MIBC).**

The bypass switch can be placed in the ‘override’ position when the temperature sensor is being tested or when the temperature sensor is being repaired. In order to bypass a temperature sensor in a specific pontoon, place the switch for the pontoon from the ‘normal’ position to the ‘override’ position. Place a red and white tag on the switch to clearly indicate that the switch has been placed in the bypass position. Tags are located on the right hand side of the panel.

When a bypass switch is placed in the ‘override’ position, the Remote Monitoring and Control Panel ‘BYPASS ON’ **red** indicator light will illuminate (consult Section 2.3.2 “‘BYPASS ON’ Indicator” for additional information). If the alarm was active, then the **red** indicator light will de-energize and the annunciator alarm

horn will silence (consult Section 2.3.1 “Red Indicator Light and Annunciator Alarm Horn” for additional information).

### 2.4.3 Breaker Bypass Switch

There is a bypass switch for the circuit breaker trip status of the P1 Panel circuit breakers located in pontoons B, E, H, K, N, and Q. If the circuit breakers in any P1 Panel should trip, then the control system will indicate an alarm.

#### CAUTION

**Bypass switches are for emergency situations only. If bypass switch operation is required do not continue without contacting the Mercer Island Bridge Crew (MIBC).**

The bypass switch can be placed in the ‘override’ position when the P1 Panel circuit breakers are being tested or being repaired. In order to bypass the circuit breaker trip status alarm in a specific pontoon, place the switch for the pontoon from the ‘normal’ position to the ‘override’ position. Place a red and white tag on the switch to clearly indicate that the switch has been placed in the bypass position. Tags are located on the right hand side of the panel.

When a bypass switch is placed in the ‘override’ position, the Remote Monitoring and Control Panel ‘BYPASS ON’ **red** indicator light will illuminate (consult Section 2.3.2 “‘BYPASS ON’ Indicator” for additional information). If the alarm was active, then the **red** indicator light will de-energize and the annunciator alarm horn will silence (consult Section 2.3.1 “Red Indicator Light and Annunciator Alarm Horn” for additional information).

### 2.4.4 Bridge Bypass Switch

The Bridge bypass switch is a bypass switch for all bridge alarms.

#### CAUTION

**Bypass switches are for emergency situations only. If bypass switch operation is required do not continue without contacting the Mercer Island Bridge Crew (MIBC).**

The Bridge bypass switch can be placed in the ‘override’ position when there is testing of a quantity of sensors, or when a quantity of items on the bridge being repaired that would require more than four bypass switches to be placed in the ‘override’ position. In order to bypass all bridge alarms, place the switch for the pontoon from the ‘normal’ position to the ‘override’ position. Place a red and white tag on the switch to clearly indicate that the switch has been placed in the bypass position. Tags are located on the right hand side of the panel.

When a bypass switch is placed in the ‘override’ position, the Remote Monitoring and Control Panel **red** ‘BYPASS ON’ indicator light will illuminate (consult Section 2.3.2 “‘BYPASS ON’ Indicator” for additional information). If the alarm was active, then the **red** indicator light will de-energize and the annunciator alarm horn will silence (consult Section 2.3.1 “Red Indicator Light and Annunciator Alarm Horn” for additional information).

### 2.4.5 Water Bypass Switch

There is a bypass switch for all water sensors located in a single pontoon. The water sensors monitor the amount of water in a pontoon cell, and if any single cell indicates a high level of water, this will place the entire pontoon in an alarm state.



**CAUTION**

**Bypass switches are for emergency situations only. If bypass switch operation is required do not continue without contacting the Mercer Island Bridge Crew (MIBC).**

The bypass switch can be placed in the ‘override’ position when a water sensor is being tested or repaired. In order to bypass a water sensor in a specific pontoon, place the switch for the pontoon from the ‘normal’ position to the ‘override’ position. Place a red and white tag on the switch to clearly indicate that the switch has been placed in the bypass position. Tags are located on the right hand side of the panel.

When a bypass switch is placed in the ‘override’ position, the Remote Monitoring and Control Panel ‘BYPASS ON’ **red** indicator light will illuminate (consult Section 2.3.2 “‘BYPASS ON’ Indicator” for additional information). If the alarm was active, then the **red** indicator light will de-energize and the annunciator alarm horn will silence (consult Section 2.3.1 “Red Indicator Light and Annunciator Alarm Horn” for additional information).

## 2.5 EMERGENCY ALARMS AND CONDITIONS

There are alarms and conditions that could result from damage to a pontoon or in failure of a pontoon electrical system. As a result, sensors and monitoring equipment have been installed on the bridge. The sensors, when activated, will cause the control system to go into an alarm state. Other dangerous conditions can exist that the Mercer Island Bridge Crew is required to monitor independently of the control system.

Sensors are connected to the control system and the control system will transmit a warning to WSDOT personnel so that the appropriate emergency response team can mobilize. The alarm signal warning in the Mercer Island Bridge Shop is an illuminated **red** indicator light and an audible annunciator alarm horn located above the Remote Monitoring and Control Panel. There are two other locations that receive alarms. The first is the subject pontoon (where the fault occurred) P5 Panel if this is a water sensor alarm. The control system will monitor the alarm to verify that it lasts for 5 minutes, and then notify the second location - the Traffic Systems Monitoring Center (TSMC). The control system will use the auto dialer in the Dupline Control System Panel. The operation of the auto dialer is described as part of this section. Generally, the TSMC technician receiving the message must acknowledge the alarm electronically and then notify the Mercer Island Bridge Crew maintenance personnel.

The navigation light failures, weather station monitoring, earthquakes, and power outages are not integrated alarms into the control system. The procedures to respond to these conditions are provided as a part of this section.

All emergency alarms or conditions must be investigated.

### 2.5.1 Breaker Fault Alarm

A circuit breaker trip detector is located in each P1 Panel located in Pontoons B, E, H, K, N, and Q. The circuit breaker trip detector, if activated, will transmit a signal to the P4 Panel in the pontoon. The P4 Panel will communicate the alarm through the control system to alert WSDOT personnel to the fact that a circuit breaker tripped. Circuit breaker trips will likely be associated with an electrical system fault.

When a circuit breaker feeding a pontoon trips, the pontoon powered by that circuit breaker will lose power. All the other alarms for the pontoon are wired such that upon loss of power, the system controller will consider the alarms active in that pontoon. The alarm indicators for all the alarms for that pontoon will activate when power is removed. Review the panel to determine which pontoons circuit breakers have tripped, as this speeds the

investigation in the field.

### **WARNING**

**If any of these procedures are necessary contact the Mercer Island Bridge Crew (MIBC) for assistance.  
See Section 7 “Emergency Contacts” for telephone numbers.**

If this alarm occurs, perform the following steps:

1. Station one individual to communicate with the Traffic Systems Monitoring Center (TSMC) by waiting for their phone call or contacting them directly. This person will monitor the intercom system for the duration of the investigation to implement an Emergency Response if that is determined to be required.
2. Investigate the problem in a team of at least two people. Proceed to the pontoon cell where the P1 panel in the alarm state is located.
3. Determine how to solve the circuit breaker problems. Determine whether the pontoon is damaged.
4. Use the pontoon intercom system to notify MIBS of the condition of the pontoon.
5. If the pontoon has been damaged proceed to the Section 8 “Emergency Response” for the correct response to the situation.
6. If the pontoon is not damaged and team has identified the fault in the system, use the appropriate bypass switches in the HH Bypass Panel to bypass the alarm while the repairs are being performed.

## **2.5.2 Transformer High Temp Alarms**

Two thermal sensors are located at all transformer locations. These units sense the core temperature of the transformer. If the temperature rises above a preset level of the control module in the P4 panel, an alarm signal is generated and WSDOT personnel will be alerted. Under normal conditions the transformers will be warm to the touch. Overheating of the transformer is an indication that the transformer is malfunctioning.

Transformer High Temp Alarms will occur when the transformer is overheating, but may also occur under other conditions. Possible causes for the alarm to occur are if the circuit breakers feeding the pontoon tripped and disconnected power from the electrical system, or the temperature thermal sensor failed. Follow the procedure below to investigate the alarm.

### **WARNING**

**If any of these procedures are necessary contact the Mercer Island Bridge Crew (MIBC) for assistance.  
See Section 7 “Emergency Contacts” for telephone numbers.**

If this alarm occurs, perform the following steps:

1. Station one individual to communicate with the Traffic System Monitoring Center (TSMC) by waiting for their phone call or contacting them directly. This person will monitor the intercom system for the duration of the investigation to implement an Emergency Response if that is determined to be required.

2. Contact an Electrician trained and certified for High Voltage equipment operation, repair, and testing.
3. When the Electrician arrives on site, investigate the problem in a team of at least two people. Proceed to the pontoon transformers where the alarm occurred.
4. Investigate the problem. Note: If there is smoke or fire present, evacuate the pontoon immediately. Follow Section 2.5.3 “Smoke Detector Alarm” for the procedure to respond to a fire in the pontoon cell.
5. The Electrician will determine the state of the transformers and determine how to solve the overheating problems. Determine whether the pontoon is damaged.
6. Use the pontoon intercom system to notify MIBS of the condition of the pontoon.
7. If the pontoon has been damaged proceed to the Section 8 “Emergency Response” for the correct response to the situation.
8. If the pontoon is not damaged and the Electrician has identified the transformer fault, use the appropriate bypass switches in the HH Bypass Panel to bypass the alarm while the repairs are being performed.

### 2.5.3 Smoke Detector Alarm

A smoke detector is located on the ceiling of each cell that houses the transformers in Pontoons B, E, H, K, N, and Q. The smoke detector sensor, if activated, will transmit a signal to the P4 Panel in the pontoon. The P4 Panel will communicate the alarm through the control system to alert WSDOT personnel of the presence of smoke inside a pontoon. Smoke or pontoon fires will likely be associated with the electrical system.

Smoke Detector Alarms will occur when smoke or fire is present, but may also occur under other conditions. Possible causes for the alarm to occur are if the circuit breakers feeding the pontoon tripped and disconnected power from the electrical system, a transformer has overheated and is generating smoke, or the smoke detector failed. Follow the procedure below to investigate the alarm.

#### **WARNING**

**If any of these procedures are necessary contact the Mercer Island Bridge Crew (MIBC) for assistance. See Section 7 “Emergency Contacts” for telephone numbers.**

If this alarm occurs, perform the following steps:

1. When a fire occurs, refer to “Emergency Response” Section 8.5 “Fire.”
2. Once the Emergency Response procedure has been followed, contact the Electrician.
3. Once the fire department allows personnel into the pontoon (or if it was a false alarm with no fire present), investigate the pontoon.
4. When the Electrician arrives on site, investigate the problem in a team of at least two people. Proceed to the pontoon cell where the alarm occurred.
5. Determine whether the pontoon is damaged.

6. Use the pontoon intercom system to notify MIBS of the condition of the pontoon.
7. If the pontoon has been damaged proceed to the Section 8 “Emergency Response” for the correct response to the situation.
8. If the pontoon is not damaged and the Electrician has identified the smoke detector fault, use the appropriate bypass switches in the HH Bypass Panel to bypass the alarm while the repairs are being performed.

### 2.5.4 Water Level Alarm

Water sensors are installed in each cell of each pontoon. The water sensor activates an alarm when the water level in a cell reaches six inches.

Water Level Alarms will occur when the water level reaches six inches, but may also occur under other conditions. Possible causes for the alarm to occur are if the circuit breakers feeding the pontoon tripped and disconnected power from the electrical system or if the water sensor failed. Follow the procedure below to investigate the alarm.

#### **WARNING**

**If any of these procedures are necessary contact the Mercer Island Bridge Crew (MIBC) for assistance. See Section 7 “Emergency Contacts” for telephone numbers.**

If this alarm occurs, perform the following steps:

1. Station one individual to communicate with the Traffic Systems Monitoring Center (TSMC) by waiting for their phone call or contacting them directly. This person will monitor the intercom system for the duration of the investigation to implement an Emergency Response if that is determined to be required.
2. Investigate the problem in a team of at least two people. Proceed to the pontoon where the alarm occurred and inspect the P5 Panel. The P5 Panel will identify all the cells in which the water level alarms occur. (Press the lamp test push button on the P5 Panel to verify all lights are operating properly.)
3. Investigate each pontoon cell identified in step 3 above to verify whether the water has reached the six inch level. If the pontoon has been damaged proceed to the Section 8 “Emergency Response” for the correct response to the situation. Refer to Section 2.6 “Pontoon Dewatering” for the procedure to remove the water from the cells.
4. Use the pontoon intercom system to notify MIBS of the condition of the pontoon.
5. If the pontoon cell water level has not reached six inches, then the water sensor has failed or there is another problem with the system. Use the appropriate bypass switches in the HH Bypass Panel to bypass the alarm. Contact the Electrician to perform the required repairs to the system.

### 2.5.5 Auto Dialer Notification

An auto dialer automatically advises the TSMC if an alarm occurs. If TSMC does not answer within 6 rings, the auto dialer will wait 30 seconds, then call the next contact on the list. The auto dialer will use the following list:

1. TSMC – Northwest Region Radio
2. Northup Bridge Office
3. Bridge Supervisor’s Home Phone
4. Bridge Supervisor’s Cell Phone
5. Assistant Superintendent’s Home Phone
6. Assistant Superintendent’s Cell Phone
7. Superintendent’s Home Phone

Phone numbers can be found in Section 7 “Emergency Contacts,” which is periodically updated.

The auto dialer message will be:

“This is the I90 bridge alarm system. Please notify maintenance. Please acknowledge.”

The individual receiving the alarm will acknowledge by dialing Star-9. The auto dialer will reply:

“Alarm acknowledged. You have 120 minutes to clear the alarm.”

The maintenance crew has 120 minutes to find and repair the cause of the alarm or else the alarm repeats.

### 2.5.6 Navigation Light Failure

The navigation lights should energize (illuminate) at dusk each day, and remain illuminated until the following morning.

The navigation lights are maintained and inspected regularly to replace faulty light bulbs in the fixtures.

#### **WARNING**

**If any of these procedures are necessary contact the Mercer Island Bridge Crew (MIBC) for assistance. See Section 7 “Emergency Contacts” for telephone numbers.**

If the navigation lights do not illuminate properly, perform the following steps:

1. If one of the navigation lights does not illuminate at night, then the light should be replaced as soon as possible during the next inspection.
2. If none of the navigation lights illuminate at night, proceed to the Remote Monitoring and Control Panel and press the **black** ‘NAVIGATION LIGHTS ON/OFF PUSHBUTTON.’
3. If the navigation lights still do not illuminate, contact the Seattle Harbor Patrol to notify them of the problem.

### 2.5.7 Weather Station

A weather station is located on the south side of the Homer Hadley Bridge’s Pontoon J. The monitoring

equipment will provide immediate weather data regarding the wind speed, duration and direction, precipitation, air temperature, and humidity. This information assists in evaluating the need to temporarily close the bridge to traffic.

The operator should refer to “Emergency Response” Section 8.2 “Storms” to determine when the weather conditions reach a potentially unsafe condition.

### **2.5.8 Earthquake**

An earthquake can occur at anytime. An earthquake can result in unsafe conditions on the bridge or damage to the bridge. When an earthquake occurs, refer to “Emergency Response” Section 8.7 “Earthquake.”

### **2.5.9 Power Outage**

A power outage may occur at any time. If a power outage occurs:

1. Notify Mercer Island Bridge Crew (MIBC) immediately and give a status report. See Section 7 “Contacts and Telephone Numbers” for telephone numbers.

Operation during a power outage:

1. When a power outage occurs the Mercer Island Bridge Shop may lose power, the bridge may lose power, or both locations may lose power. The Mercer Island Bridge Shop and the bridge have separate and independent utility power services.
2. The electrical control system in the Mercer Island Bridge Shop is equipped with an Uninterruptible Power Supply (UPS) that will power the system for approximately 30 minutes. This will allow the Remote Monitoring and Control Panel to be operational and sound an alarm for this time period.
3. If power is only out to the Mercer Island Bridge Shop and the bridge is still powered, then the equipment in the bridge will continue to operate properly. Any alarm or condition will be alarmed and reported for the next 30 minutes.
4. If power is only out to the bridge and the Mercer Island Bridge Shop is still powered, then the equipment in the bridge will be de-energized. The lack of power will cause all the alarms for the bridge to be active.
5. The operator will be required to investigate the alarms as described in Section 2.5.

## **2.6 PONTOON DEWATERING**

The Homer Hadley Bridge is a floating structure and can sink if the bridge takes on too much water. The bridge is equipped with a permanent bilge piping system which permits rapid water removal from pontoon cells. This dewatering system exists to remove water that accumulates in the pontoon cells due to a severe leak or mere accumulation of water.

The bilge pipe discharge ends are 4-inch standard stainless steel pipes. The pipe terminal fittings are generally grouped three abreast on the south exterior face and extend 3-feet beyond the pontoon exterior wall, beneath the south cantilever. Each group of fittings serve the five transverse cells at that location. The exceptions to these termination points are the lower decks at either end, Pontoons A, B, C, D, Q, and R.

The system works by drawing water through the pipes, using one or both of the trailer mounted, diesel driven pumps owned and operated by WSDOT. The pumps, and the suction and discharge hoses, are stored at the locations listed below. (If the water is calm the M/V Driftwood II can be employed to stage pumping operations.)

<b>Location</b>	<b>Pump Type</b>
H.H. West Lower Deck	One Godwin Pump Damage Control Equipment
H.H. East Lower Deck	Four Grindex Pumps One Generator Damage Control Equipment
L.V.M. West Lower Deck	One Godwin Pump Damage Control Equipment
L.V.M. East Lower Deck	One Godwin Pump Damage Control Equipment
Mercer Island Bridge Shop	One Godwin Pump Damage Control Equipment

The pumps identified as Godwin Pumps may actually be Power Prime Pumps. Since the pumps are very similar and operated in the same manner, they are all referred to as Godwin Pumps.

The pump is able to draw water from four cells concurrently by use of a four valve manifold connection. The portable suction hoses are semi-opaque. This allows the operator to observe the water flow from each cell so they are able to determine when manifold valves should be closed as suction is lost in the individual cells.

For a typical deck pontoon it is anticipated that approximately 4 to 5 hours of pumping time is required to dewater a cell filled to the lake water elevation, if the bilge system is used. Four transverse cells in a similar pontoon, filled to the lake surface elevation, will require approximately the same amount of time to dewater. If the water level rises to the top of the cell (in a deck pontoon) then the dewatering time will increase approximately 7 hours, using the bilge pumping system. The deeper pontoons of the elevated spans require additional time for dewatering relative to their respective increase in cell volume.

For minor dewatering operations required during maintenance, an electric submersible pump is used. The pump discharge hose is connected to a pumping port opening which is accessed from the pontoon interior.

## 2.6.1 Procedure for Operating the Godwin Pump

### **WARNING**

**If any of these procedures are necessary contact the Mercer Island Bridge Crew (MIBC) for assistance. See Section 7 “Emergency Contacts” for telephone numbers.**

The Godwin Pump consists of a diesel engine directly connected to a pump, which is piped to a manifold that consists of piping and valves to intake and discharge the water.

Godwin Pump hose connection procedure:

1. Bring the pump to the pontoon where the flooded cell is located. Follow standard procedures regarding towing. The Godwin Diesel Pump is heavier at the end of the pump with the manifold, and as the diesel is used, the balance of weight shifts. Secure the pump in the necessary location,

- place blocks under the wheels to prevent movement.
2. The pump is equipped with a suction manifold that sucks the water into the pump, and a discharge manifold that discharges the water back into Lake Washington.
  3. When selecting and attaching hoses, verify that there are no blockages or material in the hoses.
  4. There are 4-inch and 3-inch valved connections to the suction manifold. The 4-inch connection is aligned directly with the pump intake and the 3-inch connections are on a separate section of the manifold at a higher elevation than the 4-inch connection. Use the snap connector at the end of the 4-inch or 3-inch translucent hose to connect to the corresponding suction valve of the suction manifold. The other end of the hose should have a suction strainer attached to it if it will be placed directly into the pontoon cell. Otherwise, connect the other end of the hose to the bilge pipe connection to the cell that is to be dewatered. Verify that the valve switch on each intake manifold is in the shut (or off) position.
  5. There are 3-inch valved connections to the discharge manifold and one swiveling overboard discharge pipe. Use the snap connector at the end of the 3-inch translucent hose to connect to the corresponding discharge valve of the discharge manifold and drape the other end of the hose to pump the water into Lake Washington. It is not necessary to attach a discharge hose if the outboard discharge pipe can be rotated to discharge water into Lake Washington. It is crucial to verify that the water will be pumped into Lake Washington and not into another cell or the surface of the pontoon. Verify that the ball valve switch on each of the valves on the discharge manifold is in the shut (or off) position.
  6. Do not attempt to disconnect a hose while the pump is energized and in the process of pumping water.

Godwin Pump operation procedure:

7. Verify that the suction and discharge hoses are connected as described above, and/or the swivel discharge pipe is positioned as described above.
8. Verify that the pump is mounted on a level plane. This will allow the low oil shutdown switch to accurately determine the oil level, preventing nuisance shutdowns.
9. Place the suction line drain ball valve in the shut (or off) position. This will prevent water from flowing through the drain line.
10. Place the valve switch on the suction manifold with the hose connection to the open (or on) position. This will allow water to flow through the valve.
11. Place the discharge valve in the shut (or off) position. This will prevent water from discharging from the pump and allow the pump to build up pressure while starting.
12. Turn the key switch on the control panel to the 'on' position to start the engine. The control panel provides the speed of the motor (RPM), oil temperature, engine temperature, alternator failure red indicating light, pump pressure, amperage, hours of operation, and a red indicating light that indicates on a reset button (the button indicates that shutdown conditions were present when the engine was last operated).
13. Adjust discharge pressure by adjusting the discharge valve.



Godwin Pump shutdown procedure:

14. Place the discharge valve in the shut (or off) position.
15. Monitor the engine speed (RPM) as it slows down to the low setting.
16. Turn the key switch on the control panel to the 'off' position.

Godwin Pump hose removal procedure:

17. Verify that the engine is off and the pump is not operating.
18. Place the suction line drain ball valve in the open (or on) position. This will allow water to flow through the drain line. Wait a few minutes for the water to drain from the manifold.
19. Place the discharge valve in the open (or on) position.
20. Use the snap connector to remove all hoses from the manifold.
21. Place all valves in the shut (or off) position. This includes the discharge valve, the suction line drain ball valves, and the valves on the manifold connections.
22. Return all equipment to the storage location that the equipment came from.

## 2.6.2 Procedure for Operating the Grindex Pump and Generator

### **WARNING**

**If any of these procedures are necessary contact the Mercer Island Bridge Crew (MIBC) for assistance. See Section 7 "Emergency Contacts" for telephone numbers.**

Grindex Submersible Pump hose connection procedure:

1. Bring the pump and generator to the pontoon where the flooded cell is located. Follow standard procedures regarding towing. Secure the generator in the necessary location, place blocks under the wheels to prevent movement.
2. The Grindex Submersible Pump has a discharge end that requires a hose connection. The connection requires a snap connector for a 4-inch hose. Do not carry the pump by the hose attachment, utilize the pump tether.
3. Locate the discharge hose such that it will discharge directly into Lake Washington and secure the hose in place.
4. The Grindex Submersible Pump does not have an attachment for a suction hose, as the suction of the submersible pump is built into the pump.

Grindex Submersible Pump and Generator operation procedure:

5. Verify that the discharge hose is connected as described above.
6. Lower the Grindex Pump into the pontoon cell by the pump's tether.

7. Submerge the pump into the water. Note that the pump should not run dry and the water level in the cell must be monitored by the operator to verify that the pump is not dry.

Start the generator. Follow standard procedures in safely operating the generator.

8. Verify the voltage regulator switch is in the 'on' position.
9. Verify all external electrical equipment connected to the generator is turned off.
10. Verify all receptacle and main breakers are on.
11. Verify both the voltage selector and direct hook-up terminal doors are closed.
12. Place the ignition switch in the 'on' position.
13. Press and maintain the 'safety circuit bypass' button, and simultaneously press and maintain the 'start' button. Maintain the 'start' button until the engine starts or after 15 seconds have elapsed. Release the 'safety circuit bypass' button when the engine oil pressure reaches 20 PSI.
14. Allow the engine to warm up for 3 to 5 minutes.
15. Check the control panel for 240 volt operation and that no diagnostic lights are illuminated (energized). Refer to the generator manual for trouble shooting any problems in operating the generator.
16. Close side doors for optimum cooling of the unit while running.

Once power is being generated:

17. Connect the pump's electrical cord to the generator. Once power is connected to the pump, the pump will start pumping water.
18. Verify that water is flowing through the hose and being pumped safely into Lake Washington.

Grindex Pump and Generator shutdown procedure:

19. Turn off the pump by disconnecting the pump's electrical cord from the generator.
20. Verify the pump is off and is not operating.
21. Verify all miscellaneous connected loads to the generator are turned off.
22. Turn off the generator by placing the ignition switch in the 'off' position. Follow standard procedures in safely turning off the generator.
23. Remove the pump from the pontoon cell by the pump's tether.
24. Use the snap connector to remove the hose from the pump.
25. Return all equipment to the storage location that the equipment came from.